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## **Sedimentology of a Grenvillian Neoproterozoic foreland basin succession in northern Scotland: a new combined interpretation**

H Bonsor, M Krabbendam, R Strachan, T Prave

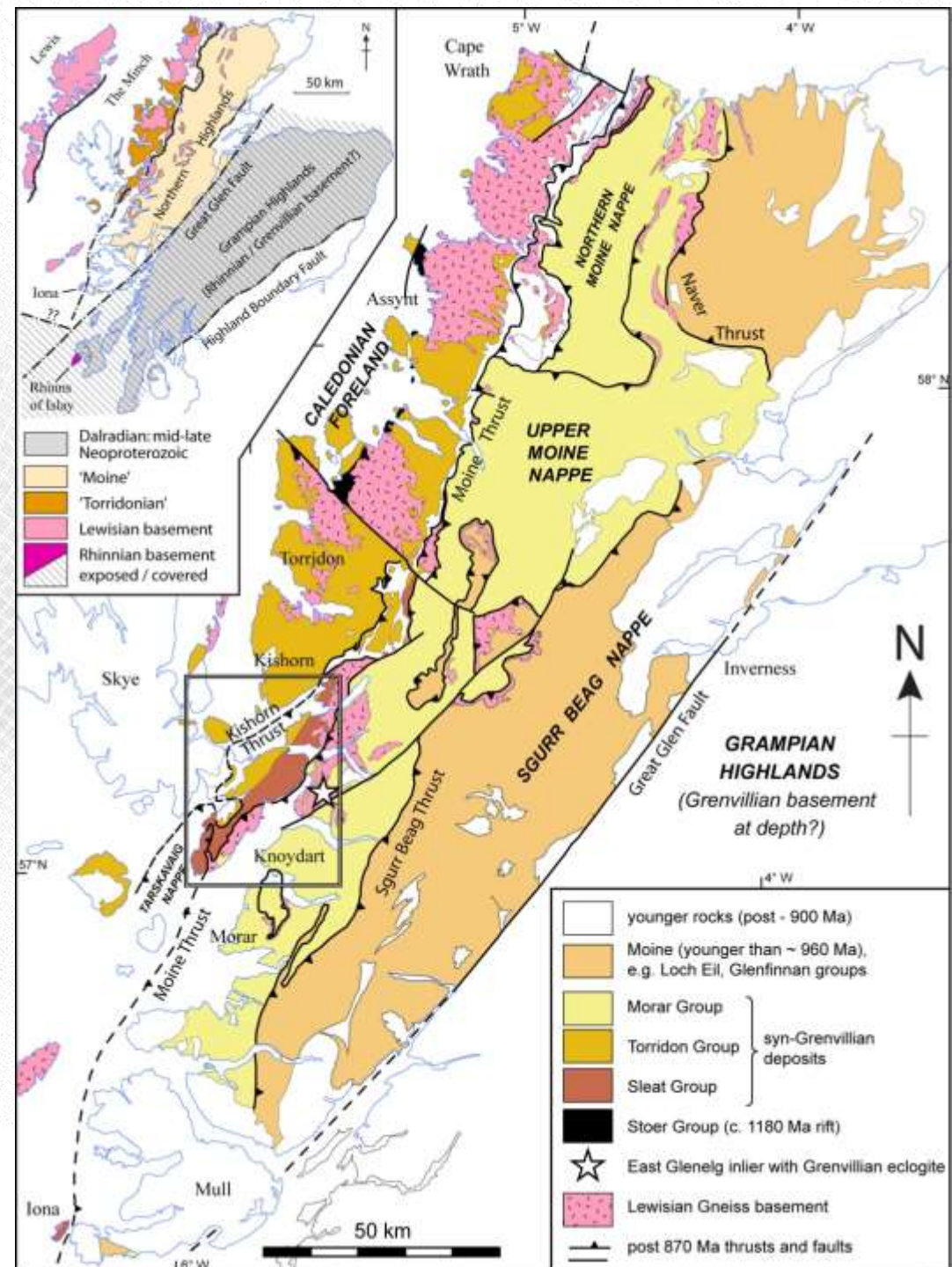


# Before 2000

(prior to detrital zircon studies)

In Scotland consensus was:

- Torridonian sediments deposited in fault-bounded rift basins, fluvial
- Moine (meta) sediments deposited in *separate* fault-bounded rift basin; shallow marine
- Torridonian and Moine have nothing to do with each other





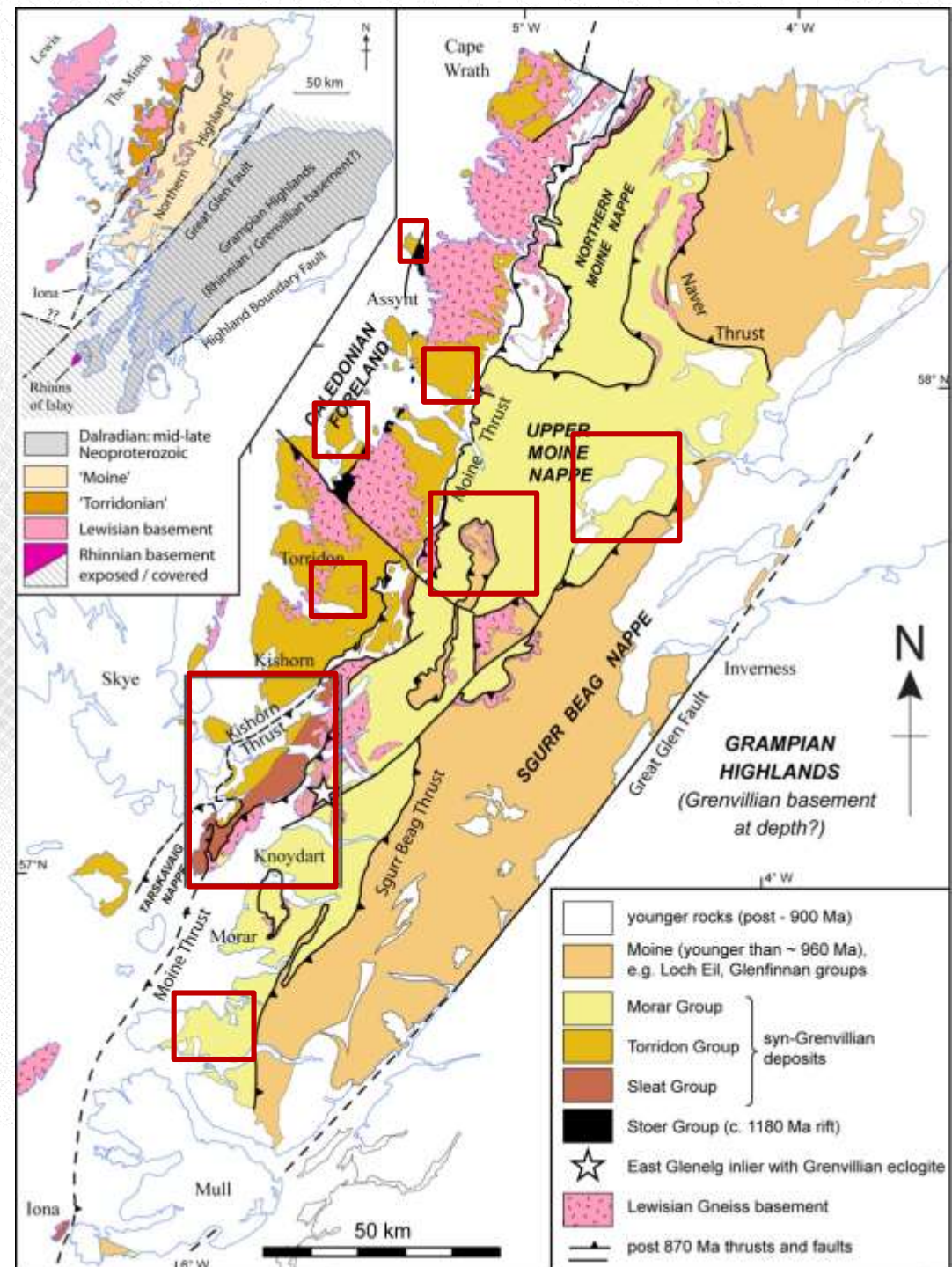
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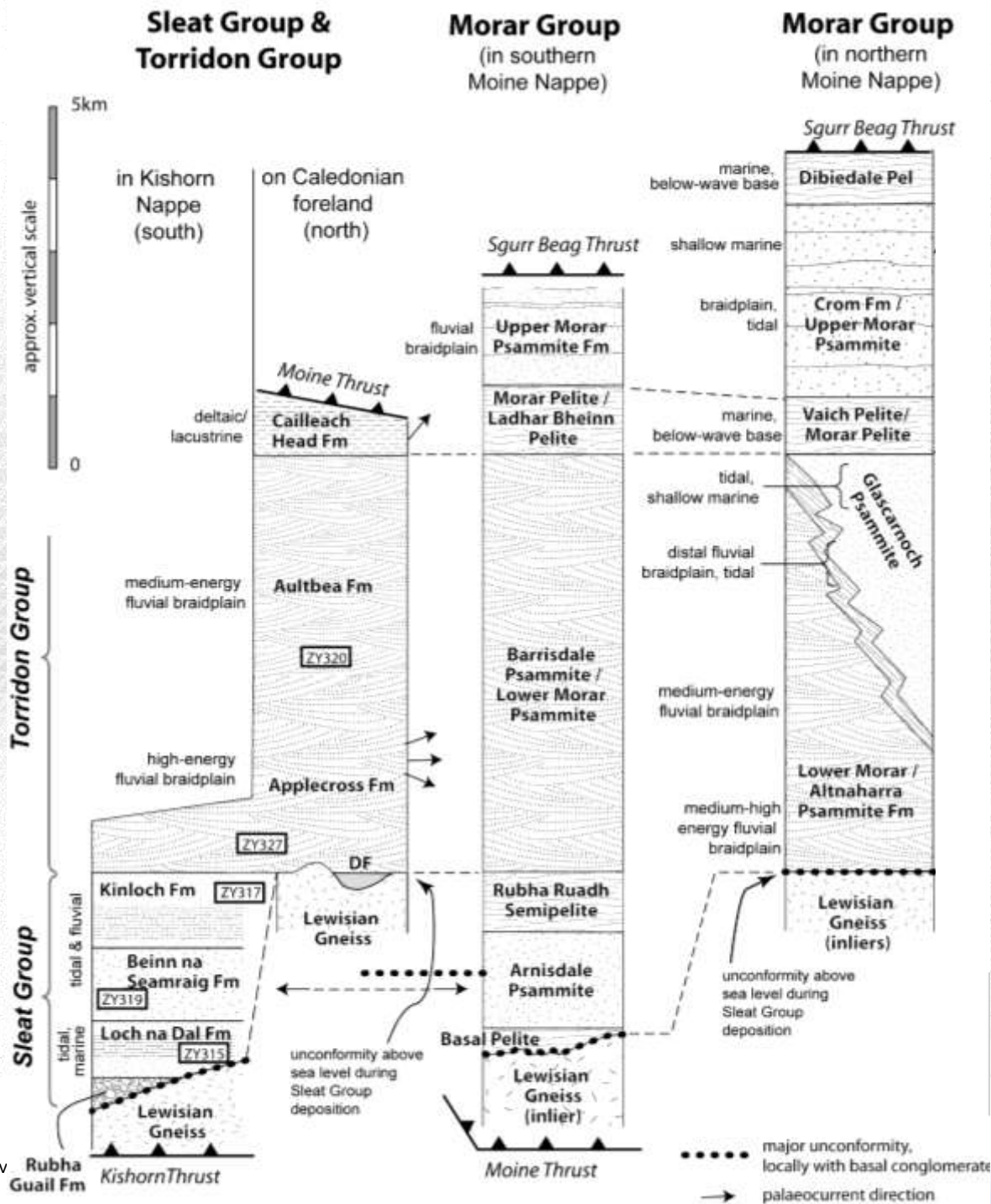
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## Recent sedimentology work



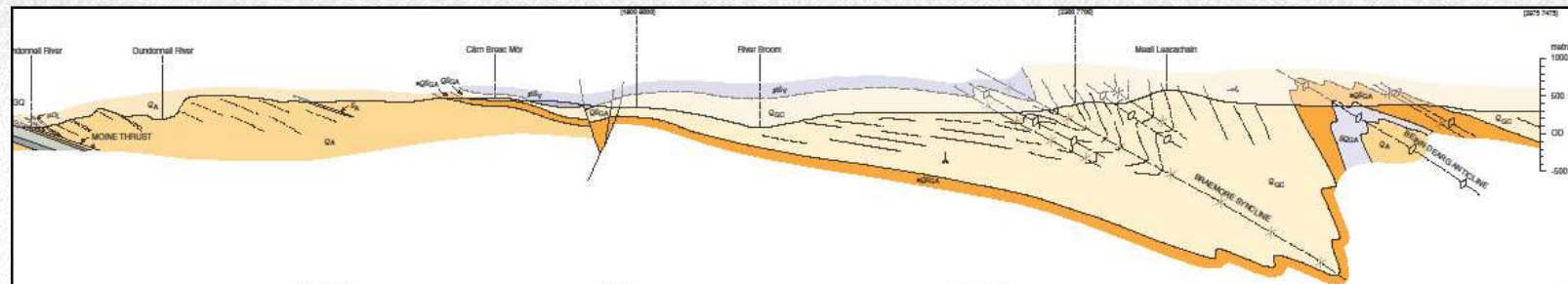
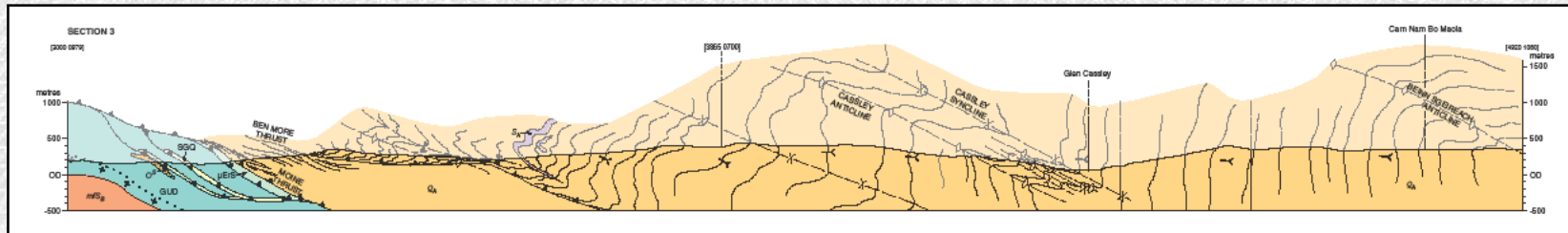
West

East

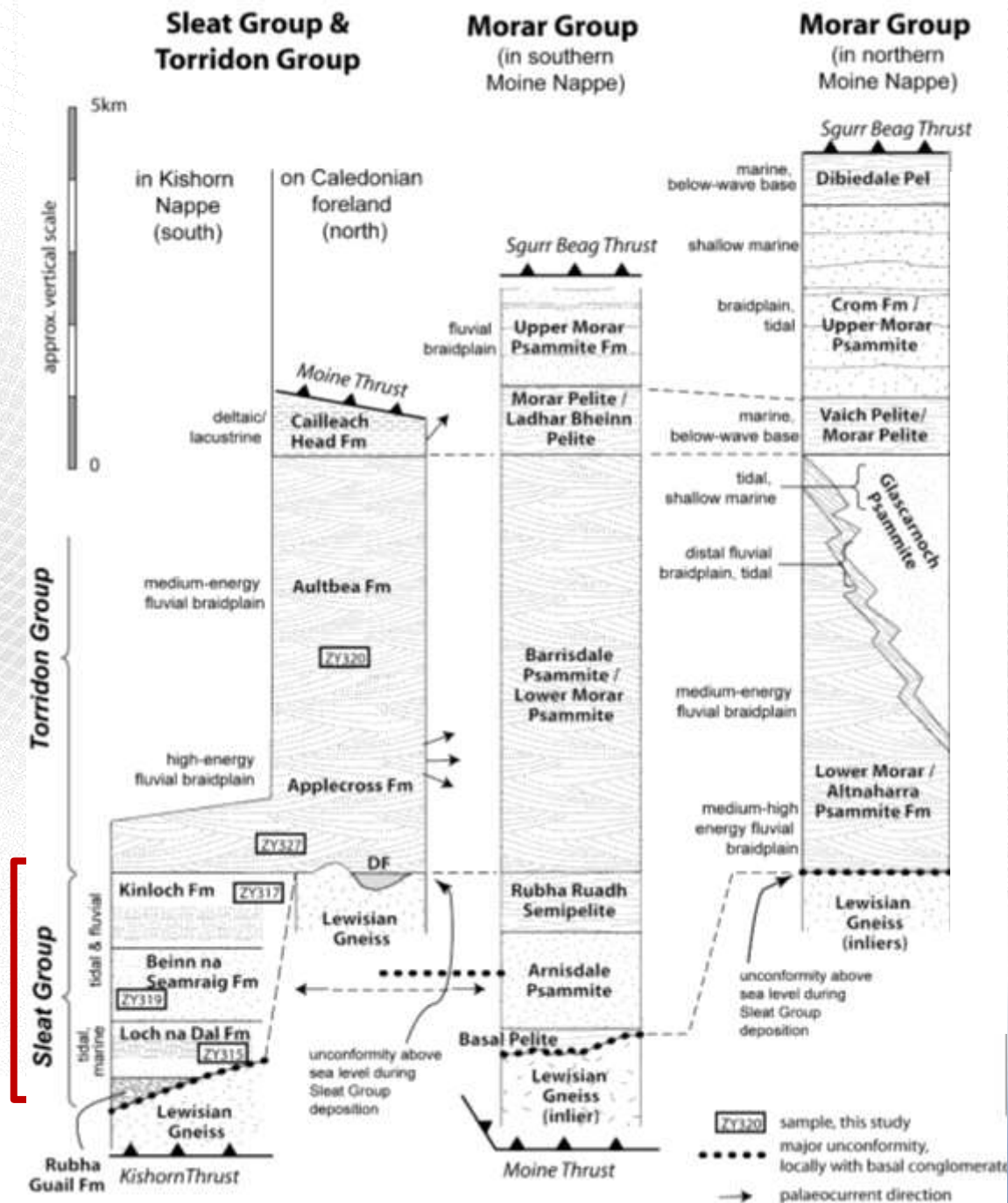




## Scale of this stratigraphy

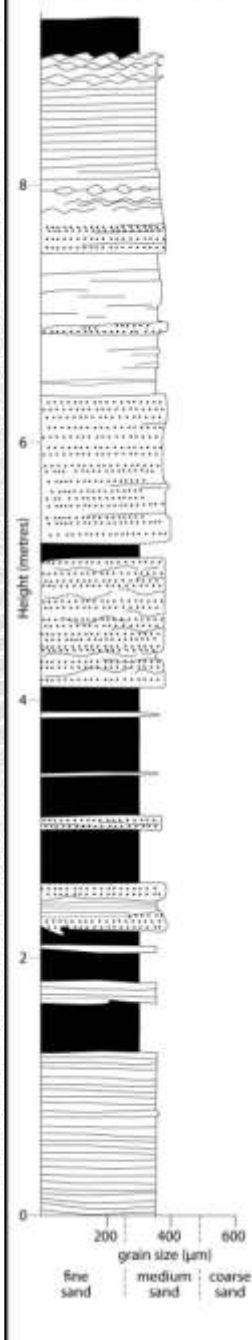


# 1) Sleat Group

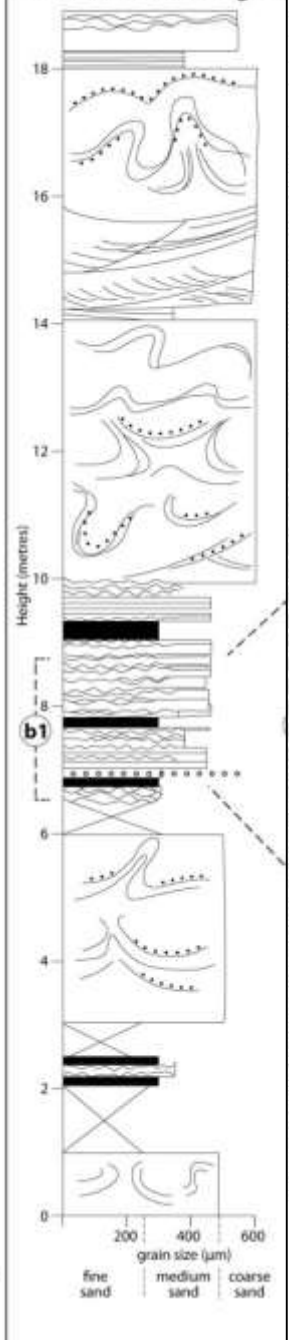




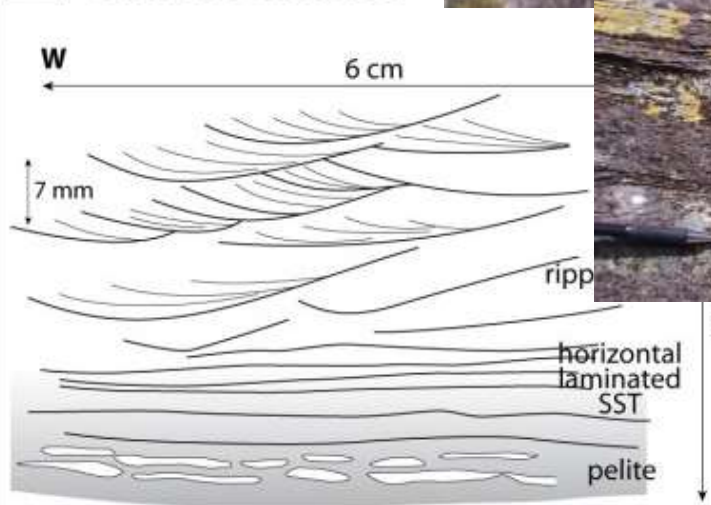
# **a** Loch na Dal Fm



# **b** Bean na Seamraig Fm



# **c** Kinloch Formation

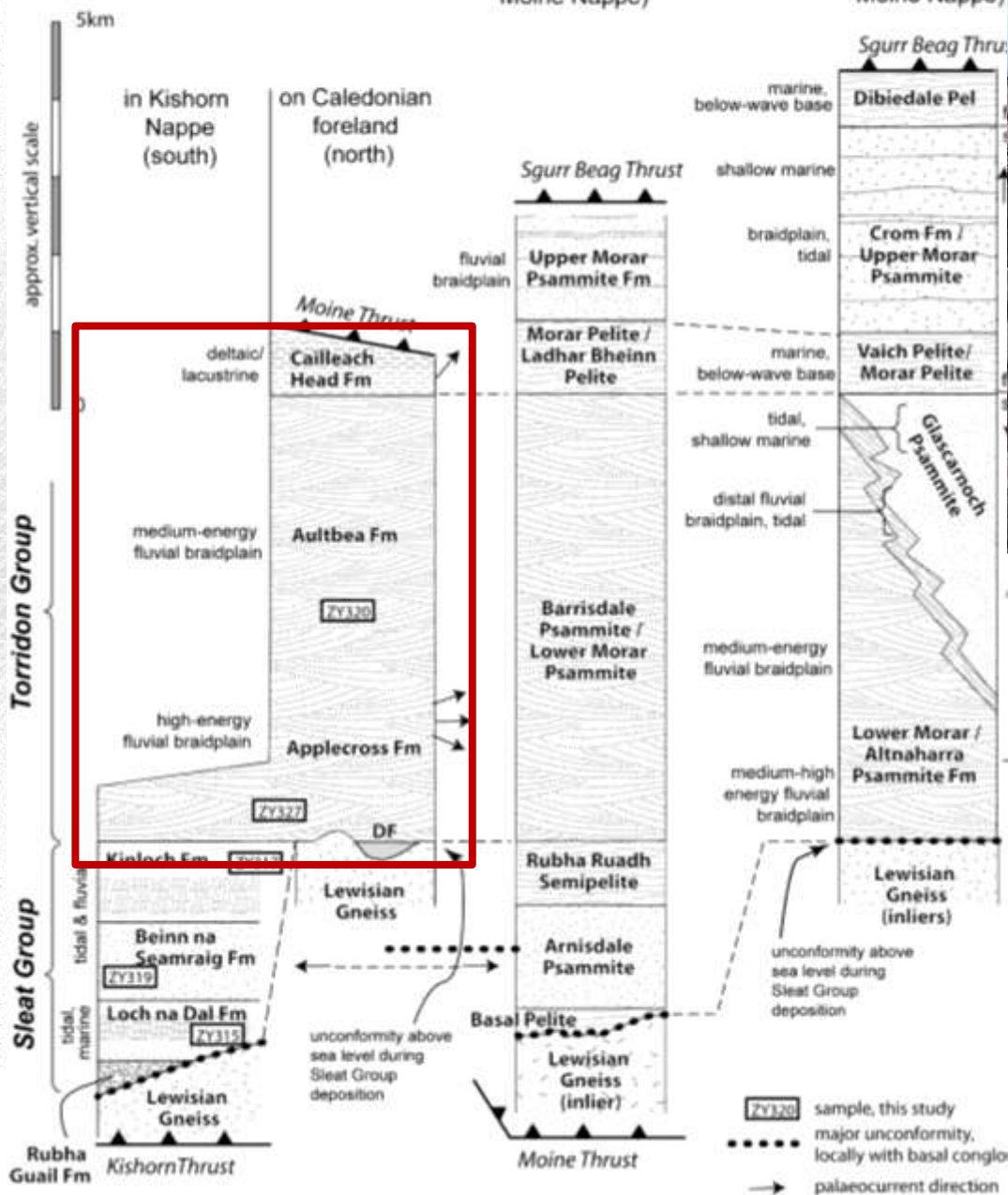




## Sleat Group & Torridon Group

## Morar Group (in southern Moine Nappe)

## Morar Group (in northern Moine Nappe)



## 2) Torridon Group



- 5-6 km thick
- Very consistent facies, with very gradual and slight changes from high to medium-high fluvial facies
- Fast, sustained deposition, significant dewatering

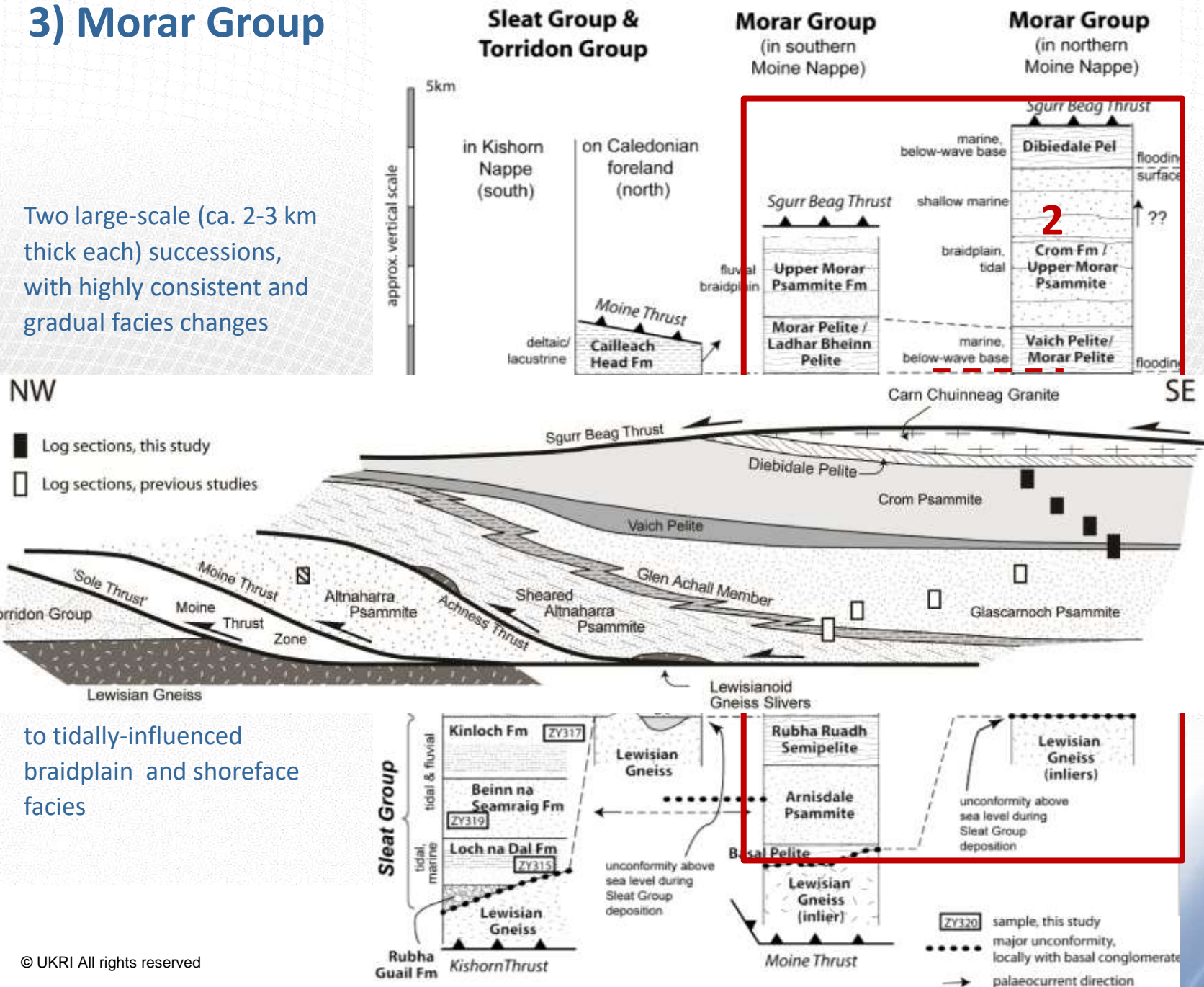




### 3) Morar Group

Two large-scale (ca. 2-3 km thick each) successions, with highly consistent and gradual facies changes

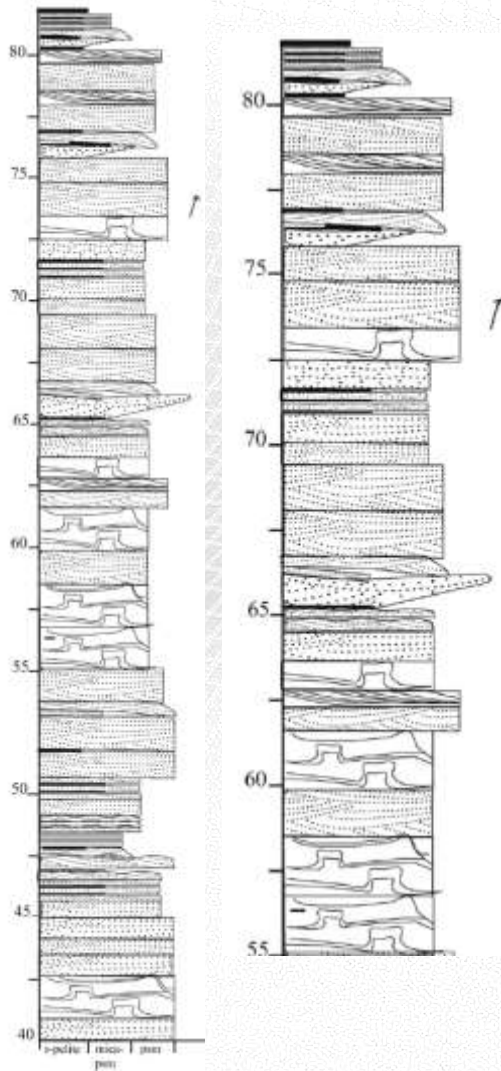
to tidally-influenced braidplain and shoreface facies





## Lower Morar Succession :

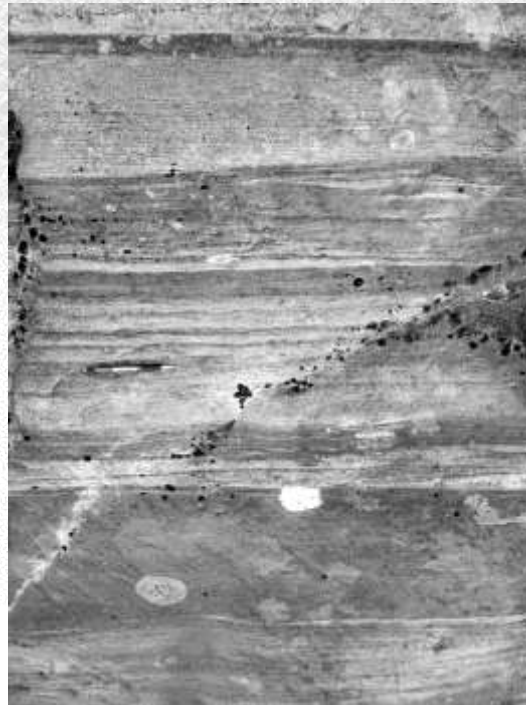
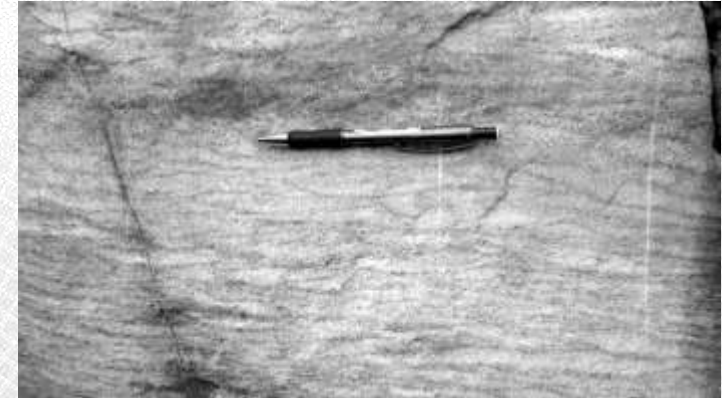
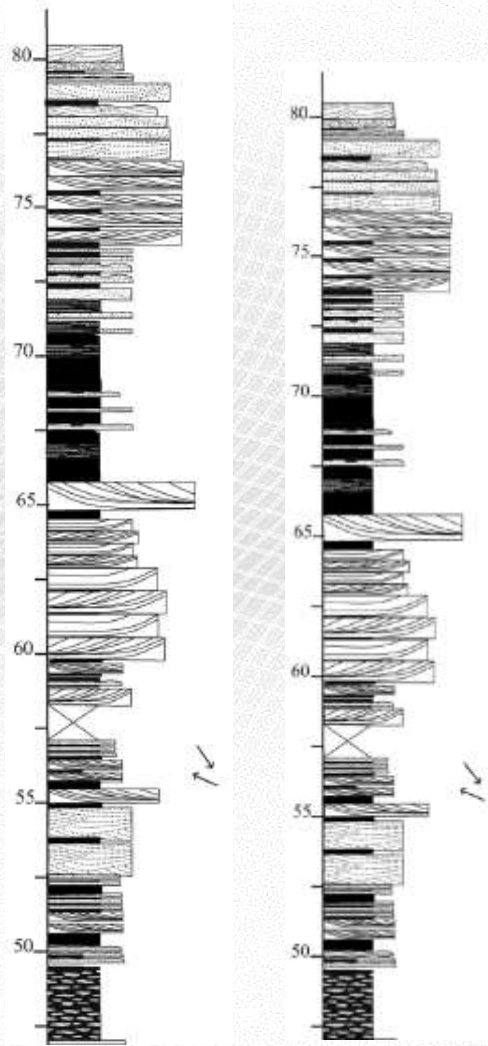
Lower energy fluvial facies to tidally-influenced braidplain and shoreface facies





## Lower Morar Succession:

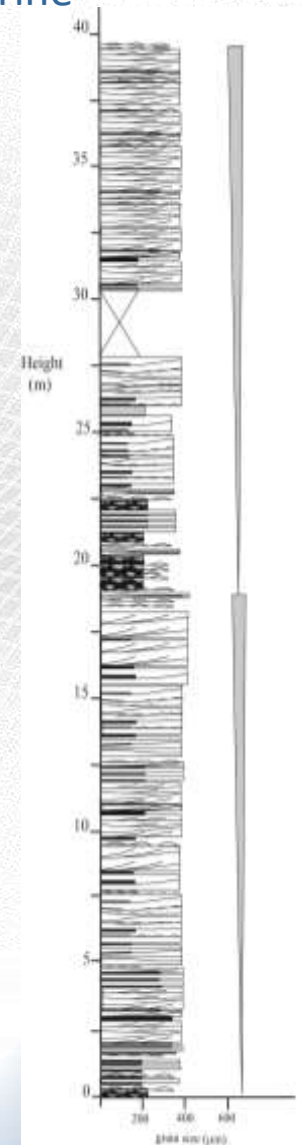
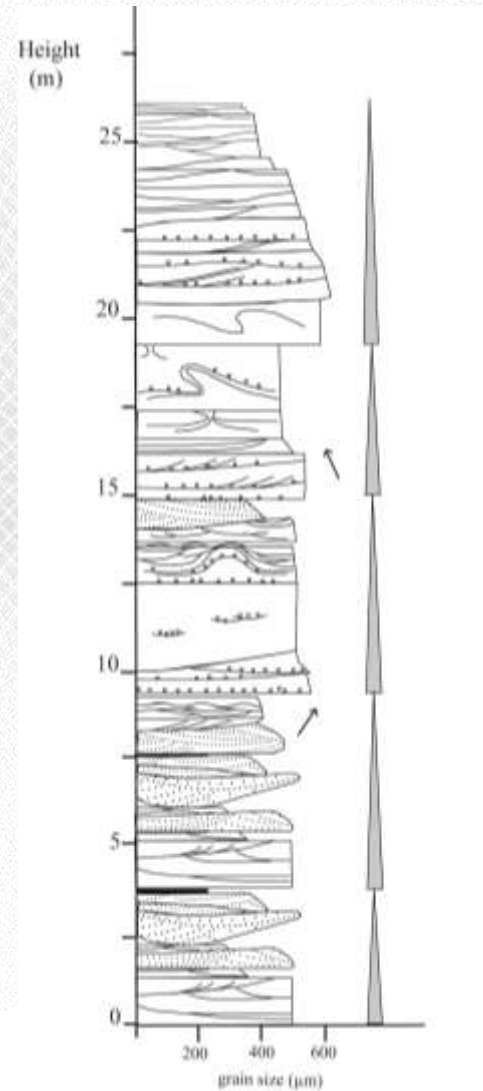
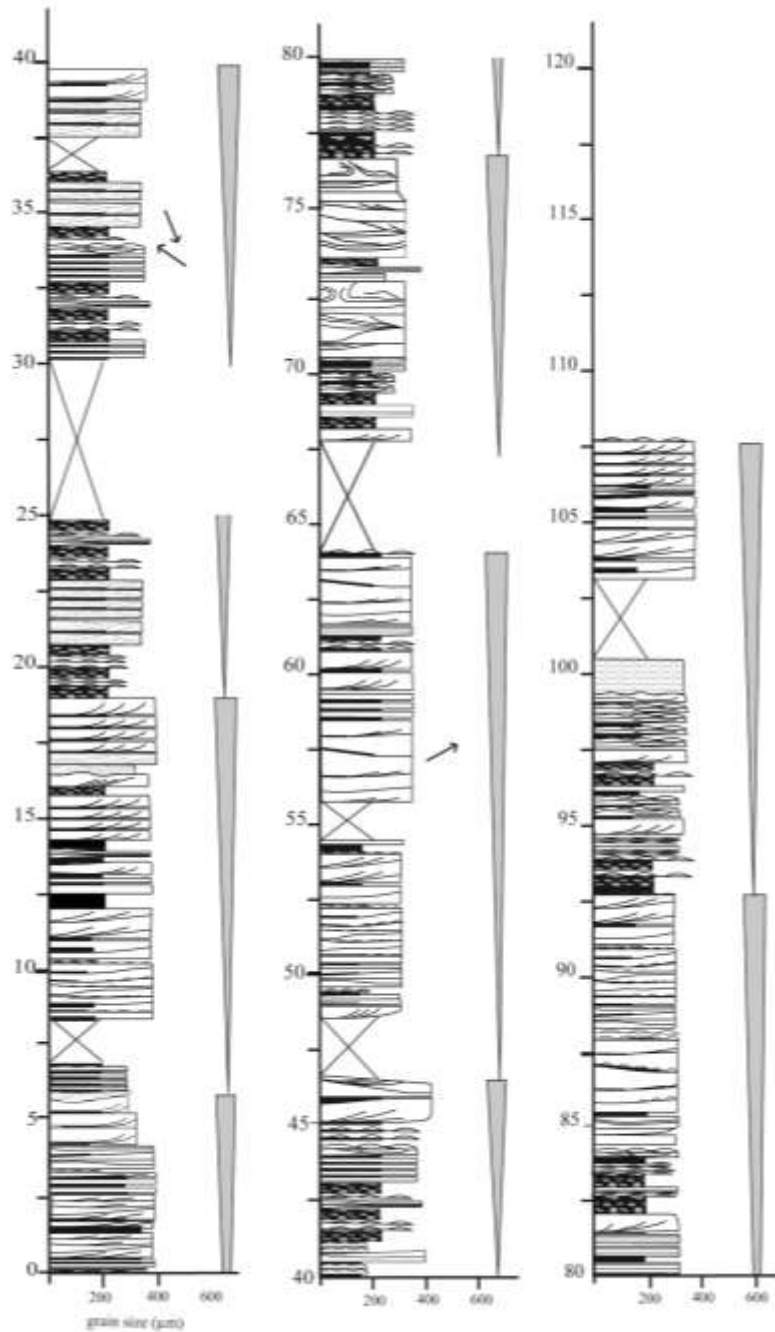
Lower energy fluvial facies -- tidally-influenced braidplain -- shoreface facies





## Upper Morar Succession

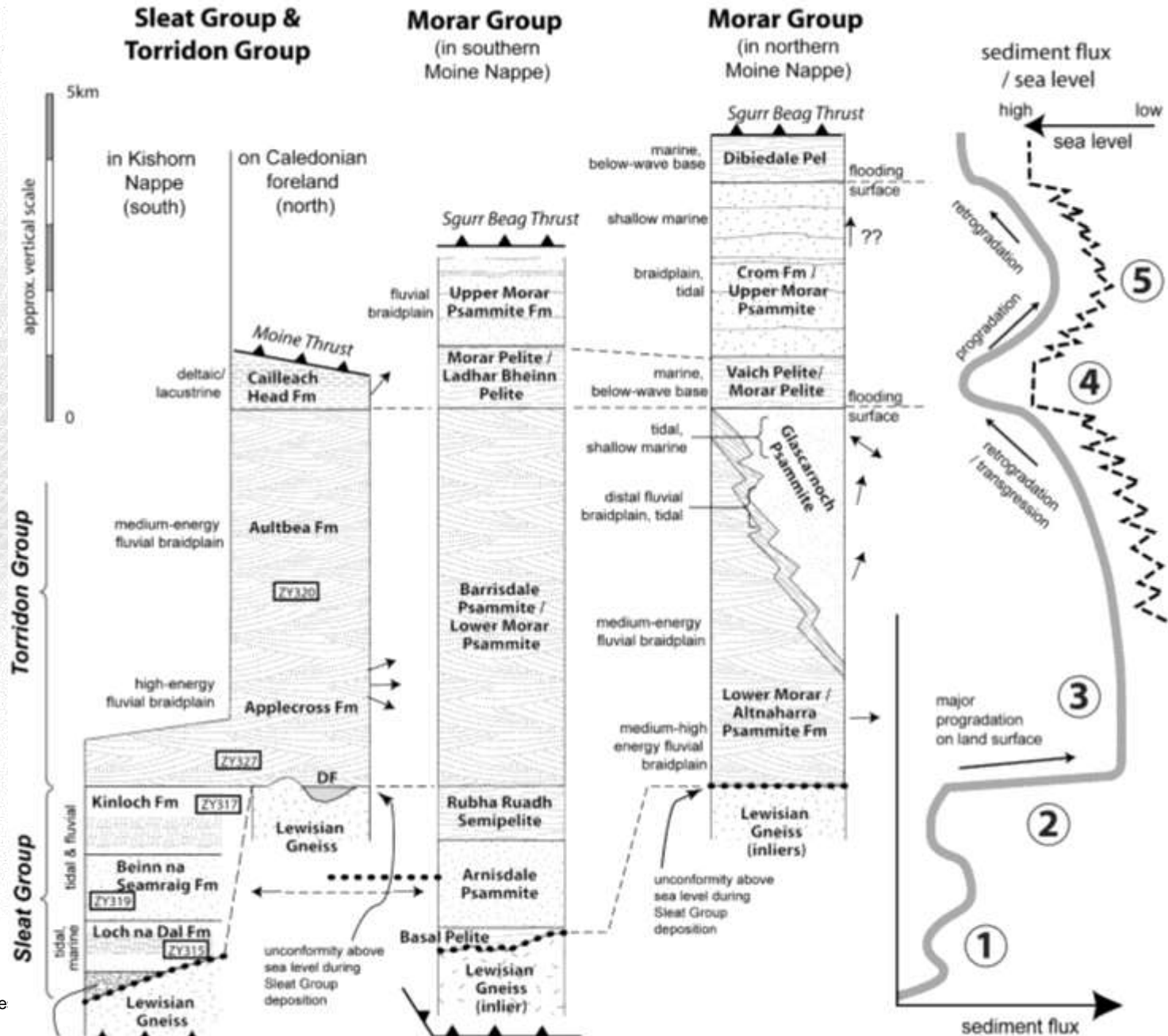
Shallow marine -- tidally-influenced distal  
braidplain shoreface -- Shallow marine







# Putting this altogether – implications



- Scale of stratigraphic thickness and consistency of facies – only very gradual changes over ca. 9 km thickness
- Multiple laterally active channels at any one time
- Large sheet flows common in some settings, but not ubiquitous
- Rapid erosion and deposition

